Perceptions of Banks' Fair Value Estimates in Different Investor Protection Environments

Anna-Maija Lantto and Juha Mäki

Abstract

This study analyses 151 banks from 26 European countries between 2014 and 2021 and examines whether challenges related to IFRS 13 Fair Value Measurement implementation have been resolved in Europe and whether the value relevance of the fair value (FV) estimates disclosed by firms is associated with the investor protection (IP) environment during an eight-year time period. The study contributes to the scant literature examining the value relevance of the FV hierarchy in Europe by showing that the investor protection environment plays a role in explaining the differences in the value relevance of the FV estimates years after IFRS 13 implementation. The findings of the study imply that investors only found the FV estimates useful and reliable, suggesting that implementation challenges have been resolved in an environment offering strong protection for investors during this special period.

Keywords

Fair value accounting, fair value hierarchy, financial instruments, IFRS 13, investor protection

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Introduction

This study examines whether challenges related to IFRS 13 *Fair Value Measurement* implementation have been resolved in Europe and whether the value relevance of the fair value (FV) estimates disclosed by firms is associated with the IP environment between 2014 and 2021. Although Filip, Hammami, Huang, Jeny, Magnan and Moldovan (2021a) show that 'the value relevance of FV levels has indeed experienced an upward trend since the financial crisis, with value relevance of L3 FV assets actually closing the gap with L1 and L2' (until 2016), we have little evidence as to whether this development has been identical across different IP environments and different time periods in Europe. Previously, Siekkinen (2016, 2) analysed a (global) sample of firms from 34 countries between 2012 and 2014 and reported that 'the value relevance of the fair value estimates is positively associated with the IP environment'. In its Post-implementation Review of IFRS 13 Fair Value Measurement[1] in 2018, the International Accounting Standards Board (IASB) concluded that 'the information required by IFRS 13 is useful to users of financial statements'. However, the IASB also noted that 'some areas of IFRS 13 present implementation challenges, largely in areas requiring judgement' but that 'evidence suggests that practice is developing to resolve these challenges'. Although it was suggested that practice is developing, we still have little knowledge of investors' perceptions of FV estimates in Europe and in different IP environments. Previous studies (e.g. Fiechter and Novotny-Farkas, 2017) provide evidence that a strong information environment plays an important role in helping investors to process FV information.

This paper analyses banks from 26 European countries [including European Union (EU) member states and the UK] between 2014 and 2021 and expands upon the above-mentioned previous work by examining how investors priced Level 1, 2 and 3 financial assets and liabilities during the time period, which was special in Europe in many respects. There were many events and processes that impacted the European stock markets during this time. In 2012, the European Commission presented draft regulations, which assigned specific supervisory tasks to the European Central Bank (ECB) and aligned the role and responsibilities of the European Banking Authority (EBA) with the new framework for banking supervision (see www.bankingsupervision.europa.eu). In late 2013, the Single Supervisory Mechanism entered into force. In response to the financial crises, the ECB implemented non-standard monetary policy to stimulate economic growth, guide inflation back to the target rate and ensure price stability. The ECB's asset purchase programme (APP) was initiated in 2014 (and lasted until 2023). The European debt crisis also took place in the EU from 2009 until the mid to late 2010s. The UK voted to leave the EU in a referendum in June 2016 and Brexit took place in January 2020. The Covid-19 pandemic caused a large shock to European economies in 2020.

Our empirical results show that when the regression is estimated with the whole sample, Level 1 financial assets, Level 2 financial assets and Level 1 and 2 financial liabilities are value relevant. While Siekkinen (2017) found that all FVs reported by European financial firms in 2012 and 2013 are value relevant to investors, we have not found evidence that Level 3 financial assets and Level 3 financial liabilities were value relevant between 2014 and 2021 for the whole sample of European firms. However, when we divide our sample of firms into three clusters: strong, medium and weak IP clusters of countries, we find that all FV assets and liabilities are value relevant for investors in a strong IP environment. Moreover, our empirical results show

1 Retrieved from the IASB site (on 2 Feb. 2024): https://www.ifrs.org/projects/completed-projects/2018/pir-of-ifrs-13-fair-value-measurement/

that none of the FVs in the FV hierarchy are value relevant for investors in a medium IP environment and investors found only Level 1 assets useful in a weak IP environment during the period from 2014 to 2021. The results of the analysis using net FV assets (i.e. FV assets minus FV liabilities) give similar results except in a weak IP environment. We find that in a medium IP environment, the three levels of financial assets and financial liabilities are not value relevant. In a weak IP environment, Level 2 and Level 3 net financial assets are value relevant. Finally, Level 1, Level 2 and Level 3 net financial assets are value relevant for investors in a strong IP environment. Taken together, these results help standard setters to evaluate the usefulness of the information required by IFRS 13 in different IP environments in Europe between 2014 and 2021.

Furthermore, we examine how investors price the different FV estimates in a strong IP environment and find that investors did not place less weight on Level 3 estimates than Level 1 and Level 2 FV assets and liabilities between 2014 and 2021. The study contributes to the literature by showing that in a strong IP environment, investors value Level 3 assets higher than Level 2 assets and Level 3 liabilities higher than Level 1 and 2 liabilities. The coefficient on Level 3 FV assets (1.001) is significantly higher than the coefficient on Level 2 assets (0.499) but not significantly higher than the coefficient on Level 1 assets (0.606). Furthermore, the coefficient on Level 3 FV assets is not different from its theoretically predicted value of 1. The results also show that the coefficient on Level 3 FV liabilities (-0.966) is significantly lower than the coefficient on Level 1 and 2 liabilities (-0.500) and is not different from its theoretically predicted value of -1.

Previously, Altamuro and Zhang (2013, 833) studied US banks between 2008 and 2011 and found that the FV of mortgage servicing rights (MSRs) based on managerial inputs 'better reflects the cash flow and risk characteristics of the underlying asset' than the FV of MSRs based on market inputs. However, other studies (e.g., Song et al., 2010; Goh et al., 2015; Lawrence et al., 2016; Siekkinen, 2016, 2017; Mechelli and Cimini, 2019) suggest that Level 3 FVs are of lower or similar value relevance to Level 1 and Level 2 FVs. Therefore, it is somewhat surprising that investors place more weight on Level 3 FV assets (liabilities) than Level 2 (Level 1 and 2) FV assets (liabilities) between 2014 and 2021 in Europe, in a strong IP environment. One explanation could be that investors found these estimations the most helpful during this special time period because these estimates are based on managerial views that are not otherwise available to investors (see also e.g., Goh et al., 2015; Altamuro and Zhang; Fiechter et al., 2022). This paper contributes to the scant literature (e.g., Siekkinen, 2017; Mechelli and Cimini, 2019; Filip et al., 2021a) studying the value relevance of the FV hierarchy in Europe by showing that the IP environment plays a role in explaining the differences in the value relevance of the FV estimates years after IFRS 13 implementation. Taken together, the present study also provides valuable information for standard setters and other stakeholders, since the findings of the study imply that investors only found the FV estimates useful and reliable (thus implementation challenges have been resolved) in an environment offering strong protection for investors during this special period from 2014 to 2021.

A series of robustness tests was conducted to corroborate our findings. We estimated the regression excluding observations from the UK to find out whether UK firms were driving the results. We found that even when the UK firms were not included in the sample of a strong IP cluster of countries, the regression results are roughly the same and all the FVs in the FV hierarchy are value relevant. We also used an alternative clustering of countries and categorised countries into 'market-based' and 'bank-based' clusters based on their financial structures to test whether our results are driven by the financial structures of countries. Our results show that this alternative clustering of countries was not driving our main results. We also estimated

the main regressions excluding observations from the Covid-19 pandemic years 2020 and 2021. Our main results remain roughly the same for the shorter period from 2014 to 2019, except for the coefficient on Level 3 financial assets (liabilities) being lower (higher) for the firms in the strong protection cluster. This finding indicates that investors would have placed more weight on Level 3 assets and liabilities, especially during the pandemic years. Finally, we examine whether the results hold for periods before and after IFRS 9 is applied (mandatory effective date of January 1, 2018), between 2014 and 2017 and 2018 and 2021 and the Brexit-period between 2016 and 2019. The results for firms in the strong IP cluster hold for the different time periods; all FV assets and liabilities are value relevant for investors in a strong IP environment in the different time frames.

This paper is divided into six sections, with the background and prior literature presented next. Section 3 presents the sample, descriptive statistics, and research design. Section 4 presents the results and Section 5 provides additional analysis. Section 6 concludes the study.

2. Background and prior literature

IFRS 13 *Fair Value Measurement* was issued in 2011 and became effective for annual periods beginning on or after 1 January 2013 (IASB, 2011)[2]. The standard was a joint project between the IASB and the FASB. It applies to IFRS standards that require or permit FV measurements or disclosures. It defines FV on the basis of an 'exit price' notion and thus FV is estimated as 'the price at which an orderly transaction to sell the asset or to transfer the liability would take place between market participants at the measurement date under current market conditions' (IFRS 13, paragraph 2). The standard requires firms to use and disclose an FV hierarchy based on the type of data used to measure FV. The assets and liabilities are categorised into the following three levels: Level 1 inputs are quoted prices in active markets for identical assets or liabilities (IFRS 13:76). Level 2 inputs are inputs other than quoted prices that are observable for the asset or liability either directly or indirectly (IFRS 13:81). Level 3 inputs are unobservable inputs for the asset or liability (IFRS 13:86). At the time when IFRS 13 became effective, IFRS 7 *Financial Instruments: Disclosures* had required European banks to disclose a FV hierarchy. However, IFRS 13 clarified FV measurement and required banks to disclose, for example, 'a description of the valuation processes used by the entity' and 'quantitative information about the significant unobservable inputs used' in the measurement (for FV measurements categorised within Level 3) and more detailed information about transfers between levels of the FV hierarchy (see e.g. PwC, 2014, 18). IFRS 13 was expected to formalize FV measurement and play 'a significant role in increasing the value relevance of (at least)' Level 3 FVs (see Filip et al., 2021a, 213).

Standard setters want to give the highest (lowest) priority to quoted prices in active markets (unobservable inputs) because it is assumed that quoted p rices provide the most reliable evidence of FV and because allowing managerial discretion in FV measurement might adversely affect the quality of financial information (e.g., Fargher & Zhang, 2014). However, both FV measurement standards allow the use of internally generated estimates of FV if active markets do not exist. Therefore, several studies have focused on examining how investors price the FVs (mark-to-model and mark-to-market assets relative to the fair estimates) reported by fi-

2The FASB has also issued the Statement of Financial Accounting Standards No. 157, Fair value measurements (SFAS 157) in 2006, which became effective for financial statements issued for fiscal years beginning after 15 November 2007. Like IFRS 13, SFAS 157 'provides a uniform definition of fair value, establishes a framework for measuring fair value, and expands disclosure about fair value measurements' (Song et al., 2010, p. 1376).

nancial institutions and their perception of the reliability of internally generated FV estimates (e.g., Song et al., 2010; Goh et al., 2015; Lawrence et al., 2016; Kolev, 2019). Analysing quarterly reports of banking firms from the US in 2008, Song et al. (2010, 1375) found that 'the value relevance of Level 1 and Level 2 fair value is greater than the value relevance of Level 3 fair values.' Moreover, Goh et al. focus on US data and report that 'while there is a significant improvement in investors' perception of the pricing of Level 3 estimates in 2010 and 2011, these instruments continue to receive a substantial valuation discount even after market stability was restored.' However, using the closed-end fund setting, Lawrence et al. (2016, 207) found that 'Level 3 fair values are of similar value relevance to Level 1 and Level 2 fair values' between 2008 and 2013.

The EBA 'believes that the introduction of IFRS 13 has improved the financial information provided in the banks' financial statements and contributed to the understanding of their balance sheets' (EBA comment letter: EBA/2017/D/1488). Furthermore, the results of previous studies suggest that 'IFRS 13 has successfully reduced the information asymmetry related to FV estimates' (Siekkinen, 2017, 435). Siekkinen (2017, 463) analysed financial firms' 2012 and 2013 annual reports/data from 29 European countries and reported that 'all FVs are value relevant to investors'. The results of the study 'show that pre IFRS 13, investors valued Levels 1 and 2 assets higher than Level 3 assets' (Siekkinen, 2017, 437). However, 'the valuation coefficient for Levels 1 and 2 assets do not differ significantly from the coefficient for Level 3 assets' following the adoption of IFRS 13 (p. 437).

Filip et al. (2021b) analysed 16 studies on the value relevance of fair value hierarchy using sample periods between 2006 and 2015. Providing meta-analysis, they suggest that value relevance is lower for Level 3 than for Level 1 and Level 2. However, Filip et al. (2021b) also report that value relevance for Level 3 increases over time. Interviews with eight preparers and auditors (in Canada) provide potential explanations for 'the apparent increase in value relevance across the three FV levels' by suggesting that 'processes for both auditors and preparers have improved over time' (Filip et al., 2021b, 277, 290). For example, auditors interviewed explain how the practice has developed during the past decade and how Level 3 FVs are 'systematically benchmarked against outside sources' and 'proprietary databases of comparable transactions and valuations' are used to audit 100% of FV transactions (Filip et al., 2021b, 277). Filip et al. (2021b, 290) report that 'the apparent increase in value relevance across the three FV levels most likely reflects a learning effect that is taking place among the key players (e.g., accounting staff, auditors, and top management) but could also reflect a regulatory effect'.

Strong corporate governance (e.g. Song et al., 2010; Siekkinen, 2017; Mechelli and Cimini, 2019) and strong IP are argued to explain the differences in the value relevance of Level 1, 2 and 3 FVs. Siekkinen (2016) examined the value relevance of FVs under IFRS 13 in an international (global) setting and found that IP affects the value relevance of FVs in the FV hierarchy under IFRS 13. The results produced by Siekkinen (2016, 2) show that 'in the strongest IP cluster investors are willing to pay close to equally much for Level 1, 2, and 3 assets, while in the medium IP cluster investors seem to value Level 1 and 2 assets higher than Level 3 assets'. Siekkinen also found that 'only Level 1 FV assets (market prices) are value relevant in the weak IP cluster of countries' (p. 2).

Previous literature (e.g. Ball et al., 2000; Morck et al., 2000) suggest that 'legal institutions that protect investors' rights are associated with numerous structural factors in the financial reporting environment that are likely to affect the price discovery process and in turn accounting information usefulness' (DeFond, Hung & Trezevant, 2007, 40). For example, Leuz, Nanda & Wysocki (2003) report that it is less likely that managers in strong investor protection coun-

tries would manage earnings because their ability to acquire private control benefits is limited and therefore, they have fewer incentives to mask performance. Studies (e.g. Christensen et al., 2013; Christensen et al., 2015; Daske et al., 2008) also report that capital markets benefit from IFRS adoption only in countries with strong legal enforcement mechanisms/strong regulatory enforcement system and where firms have incentives to be transparent. Finally, Ball (2016) asks to pay attention to not only enforcement by regulators but also enforcement mechanisms generally such as internal and external auditing, monitoring by boards, security analysts, whistle-blowers, private parties on the other side of irregular transactions, press etc. to ensure uniform implementation of IFRS around the world and realize the benefits of IFRS adoption. Even within the EU, countries have different enforcement systems (e.g., Filip et al., 2021a). Therefore, it is important to examine whether challenges related to IFRS 13 Fair Value Measurement implementation have been resolved in Europe, in different enforcement systems.

3. Data and research design

3.1 Sample

The data was collected from annual reports (years 2014–2021), i.e., consolidated financial statements and Orbis (Bureau van Dijk) databases. The data set is unique since the fair values for Level 1, Level 2 and Level 3 were manually sourced from firms' annual reports. Other firm-specific data, such as net income, total assets, book value of equity, share price and shares outstanding were collected from Orbis. The IP indicators/measures are from the World Economic Forum (WEF) and Freedom House. We first obtained a list of all banks on Orbis to construct our sample. Similar to other studies (e.g., Filip et al., 2021a; Goh et al., 2015; Siekkinen, 2016; 2017; Song et al., 2010) analysing the value relevance of FV estimates, we analysed banks because these firms have significant amounts of FV assets and liabilities.

From a starting sample of 259 banks (from Orbis), we excluded 108 banks that do not disclose required information (missing data) on FVs in their notes. Table 1 presents the sample consisting of 151 listed banks (classified as/'type of entities: Banks' in Orbis) from 26 European (including EU countries and the UK) countries. However, from a total of 1,208 firm-year observations, we were only able to use 915 firm-year observations, as variables such as net income and/or share price are not available for every firm/year in Orbis. Finally, we winsorised variables at a 1% level to control the effects of outliers.

Table 1
Geographical distribution of firms included in the sample.

Austria	8	France	12	Poland	11
Belgium	2	Germany	8	Portugal	1
Bulgaria	3	Greece	5	Romania	2
Croatia	2	Hungary	1	Slovakia	1
Cyprus	1	Ireland	4	Slovenia	1
Czechia	1	Italy	24	Spain	8
Denmark	13	Lithuania	1	Sweden	7
Estonia	1	Malta	3	The UK	24
Finland	4	The Netherlands	3	**Total**	**151**

3.2 IP clusters

The conditions of the judicial system explain the differences in legal IP between countries (e.g., La Porta et al., 1999). For example, 'independent judiciaries, which constrain arbitrary state power, ensure that state promises to respect individual rights are perceived credible' (Ríos-Figueroa & Staton, 2012, p. 104; see also e.g., North and Weingast 1989). Different corporate governance mechanisms, such as a board of directors to monitor senior management and help outside investors protect themselves against expropriation by insiders (e.g. Fama & Jensen, 1983; La Porta et al., 1999). For example, outside directors help to ensure that managers act in the interests of outside shareholders (e.g., Fama & Jensen, 1983). The previous studies also report an association between board effectiveness and earnings management (Peasnell, Pope & Young, 2005). Overall, the quality of accounting information is affected by the quality of accounting standards and regulatory enforcement, and the application of the standards (Kothari, 2000, p. 92). Enforcement of securities laws, such as 'insider trading laws may deter managers from manipulating earnings to profit from trading in the firm's stock' (Hope, 2003, p. 243).

We selected six country-level measures of investor protection: judicial independence, strength of auditing and reporting standards, efficacy of corporate boards, protection of minority shareholders' interests, regulation of securities exchanges and freedom of the press to classify countries into 'IP clusters' (see also e.g. Siekkinen, 2016; Houqe et al., 2012). This information (i.e., six IP indicators/measures) is provided by the WEF (2015–2016 & 2019) and Freedom House (2017). All measures are coded on a scale from 1 to 7. The key to the WEF's report, Global Competitiveness Report (study), used in this study, is the Executive Opinion Survey 2015, which captured the opinions of over 14,000 business leaders in 144 economies between February and June 2015. A description of each indicator/the full question and associated answers are defined in Table 2.

Table 2
The five measures of IP provided by the WEF.

INDICATOR	QUESTION	ANSWER
Judicial independence	In your country, how independent is the judicial system from influences of the government, individuals, or companies?	1 = not independent at all; 7 = entirely independent
Strength of auditing and reporting standards	In your country, how strong are financial auditing and reporting standards?	1 = extremely weak; 7 = extremely strong
Efficacy of corporate boards	In your country, to what extent is management accountable to investors and boards of directors?	1 = not at all; 7 = to a great extent
Protection of minority shareholders' interests	In your country, to what extent are the interests of minority shareholders protected by the legal system?	1 = not protected at all; 7 = fully protected
Regulation of securities exchanges	In your country, to what extent do regulators ensure the stability of the financial market?	1 = not at all; 7 = to a great extent

The study also uses 'Freedom of the press' published in 2017 by Freedom House, which measures the degree of media freedom [0 = the most free; 100 = the least free] (Freedom House, 2017). Freedom House defines its methodology as follows:

> 'Scores are assigned in response to 23 methodology questions that seek to capture the varied ways in which pressure can be placed on the flow of objective information and the ability of platforms to operate freely and without fear of repercussions. The methodology covers the Legal, Political, and Economic environments in which print, broadcast, and digital media operate. The scores reflect not just government actions and policies, but also the behaviour of the press itself in testing boundaries, as well as the influence of private owners, political or criminal groups, and other nonstate actors.' (Freedom House, 2017, 2)

Table 3 presents the number of firms, the values of the six IP variables and the average of the six IP variables. The average scores of the six indicators vary between 3.8 and 6.3. The table shows that the countries with the highest averages are Finland (6.3), the Netherlands (5.9), Denmark (5.8) and Sweden (5.8). The countries with the lowest average are Croatia (3.8), Greece (3.9) and Hungary (4.0). The IP indicators are highly correlated with each other. The correlations vary between 0.66 and 0.87.

Table 3
IP indicators by country.

COUNTRY	N	JUDICIAL IND.	STRENGTH OF STANDARDS	EFFICACY OF BOARDS	PROTECT. OF MINORITY INTERESTS	REGULATION OF SECURITIES EXCHANGES	P RESS	AVG.
Austria	8	5.7	5.8	5.8	4.9	4.6	5.7	5.4
Belgium	2	5.7	5.6	5.8	5.0	4.9	6.3	5.6
Bulgaria	3	3.3	4.6	4.5	3.7	3.7	4.5	4.1
Croatia	2	2.4	4.2	4.4	3.5	3.8	4.5	3.8
Cyprus	1	4.6	5.0	4.1	4.3	3.6	5.6	4.5
Czechia	1	4.5	5.3	5.2	4.3	4.9	5.7	5.0
Denmark	13	6.2	5.7	5.8	5.0	5.5	6.3	5.8
Estonia	1	5.4	5.6	5.4	4.3	5.1	6.0	5.3
Finland	4	6.6	6.5	6.1	6.1	6.2	6.3	6.3
France	12	4.9	5.5	5.6	4.5	5.2	5.4	5.2
Germany	8	5.0	5.8	5.6	4.7	5.2	5.8	5.4
Greece	5	3.5	4.1	4.0	4.1	3.5	4.4	3.9
Hungary	1	3.0	4.7	4.2	3.8	3.7	4.4	4.0
Ireland	4	5.6	4.8	5.7	4.8	4.5	5.9	5.2
Italy	24	4.0	4.2	4.0	3.5	3.9	5.1	4.1
Lithuania	1	4.2	5.0	5.4	3.8	4.1	5.7	4.7
Malta	3	4.0	5.7	4.6	4.9	5.2	5.6	5.0
The Netherlands	3	6.2	6.0	5.9	5.3	5.5	6.3	5.9
Poland	11	2.7	5.0	4.8	4.1	4.6	5.0	4.4
Portugal	1	4.5	4.4	4.5	4.1	4.1	6.0	4.6
Romania	2	4.0	4.3	4.3	3.7	3.7	4.7	4.1
Slovakia	1	2.8	5.3	4.8	3.7	4.1	5.4	4.4
Slovenia	1	3.5	4.3	4.8	3.4	3.5	5.6	4.1
Spain	8	4.2	4.6	4.9	3.7	4.4	5.3	4.5
Sweden	7	5.6	6.0	5.8	5.4	5.5	6.3	5.8
The UK	24	5.2	5.9	5.7	5.4	5.4	5.5	5.5

This table presents the IP variables for the individual countries that are included in the sample. The final column titled 'Avg.' presents the average of the six IP variables.

We divided the countries into clusters of similar IP environments based on the average scores for the six indicators. The strong IP cluster of countries is made up of those countries with an average above 5.2. The medium IP cluster of countries is made up of those countries with an average between 4.5 and 5.2 and the weak IP cluster of countries is made up of those countries with an average between 3.8 and 4.4. The clusters are presented in Table 4.

Table 4
Countries divided by cluster.

TRONG IP CLUSTER	MEDIUM IP CLUSTER	WEAK IP CLUSTER
Austria	Cyprus	Bulgaria
Belgium	Czechia	Croatia
Denmark	France	Greece
Estonia	Ireland	Hungary
Finland	Lithuania	Italy
Germany	Malta	Poland
The Netherlands	Portugal	Romania
Sweden	Spain	Slovakia
The UK		Slovenia

This table presents countries in the sample divided by cluster.

3.3 Descriptive statistics

Table 5 presents descriptive statistics of the variables used to test the value relevance of FVs for our sample banks. The mean share price is 0.102 and the mean FV assets, i.e., Level 1 FV financial assets (FVA1), Level 2 FV financial assets (FVA2) and Level 3 FV financial assets (FVA3), are 0.082, 0.101 and 0.013, respectively. The mean FV liabilities, i.e., Level 1 and 2 FV financial liabilities (FVL12) and Level 3 FV financial liabilities (FVL3), are 0.060 and 0.005, respectively. The means of the net non-FV assets, net income and the natural logarithm of a firm's total assets are 0.027, 0.016 and 16.727, respectively. The mean net FV assets for Net FV1, FV2 and FV3 are 0.068, 0.049 and 0.005, respectively.

On average, 17 per cent of the total assets are classified as Level 1 FV assets, 10 per cent as Level 2 FV assets and 7 percent as Level 3 FV assets. On average, 10 per cent of the total liabilities are classified as Level 1 and 2 FV liabilities and 4 per cent as Level 3 liabilities. These average values are not tabulated. Descriptive statistics of the three clusters are presented in Appendices A, B and C.

Table 5
Descriptive statistics of the whole sample

	N	MEAN	STD	MIN.	Q1	MEDIAN	Q3	MAX.
Price	915	0.102	0.735	0.000	0.002	0.010	0.272	7.065
FVA1	915	0.082	0.358	0.000	0.002	0.0117	0.041	3.069
FVA2	915	0.101	0.308	0.000	0.000	0.004	0.025	2.075
FVA3	915	0.013	0.050	0.000	0.000	0.001	0.003	0.359
FVL12	915	0.060	0.183	0.000	0.000	0.003	0.026	1.347
FVL3	915	0.005	0.025	0.000	0.000	0.000	0.000	0.184
Net FV1	915	0.068	0.302	-0.084	0.002	0.009	0.034	2.580
Net FV2	915	0.049	0.197	-0.106	0.000	0.000	0.006	1.165
Net FV3	915	0.005	0.025	-0.033	0.000	0.000	0.002	0.207
Net non-FV	915	0.027	0.197	-0.297	-0.013	0.000	0.004	1.261
NI	915	0.016	0.083	-0.007	0.000	0.001	0.003	0.696
LNTA	915	16.727	2.415	10.900	15.123	16.719	18.170	21.466
L	915	0.127	0.333	0	0	0	0	1

This table presents descriptive statistics of the variables that are used in this study. The table shows means, medians, standard deviations (Std), minimums, maximums, and quartiles of the test variables on a share basis. All variables are defined in the text.

Table 6 presents the Pearson correlations among the variables. As the table shows, the correlation between FVA1 and price is higher than the correlations between price and FVA2 and between price and FVA3. The correlation between FVL12 and price is substantially higher than the correlation between FVL3 and price.

Table 6
Correlation matrix.

	PRICE	FVA1	FVA2	FVA3	FVL12	FVL3	NET NON-FV	NI	LNTA	L
Price	1.00									
FVA1	0.82***	1.00								
FVA2	0.63***	0.78***	1.00							
FVA3	0.45***	0.63***	0.49***	1.00						
FVL12	0.67***	0.83***	0.79***	0.59***	1.00					
FVL3	0.05	0.10***	0.09***	0.68***	0.17***	1.00				
Net non-FV	0.53***	0.37***	0.54***	0.12***	0.30***	-0.06*	1.00			
NI	0.80***	0.89***	0.74***	0.51***	0.73***	0.07**	0.42***	1.00		
LNTA	0.01	0.08**	0.11***	0.06*	0.21***	0.05*	-0.04	-0.01	1.00	
L	-0.01	-0.03	-0.06**	-0.04	-0.04	-0.06*	-0.02	-0.08**	0.01	1.00

This table presents the Pearson correlations among the variables used in the regression analyses. *, **, and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively. The variables are defined in the text.

3.4 Research design

We tested the value relevance of FVs using a modified Ohlson (1995) model. We share-deflated all variables to reduce scale effects. We used the following equation (Mechelli and Cimini, 2019; Kolev, 2019) to test the value relevance of the FV estimates disclosed by firms:

$$Price_{it} = \beta_0 + \beta_1 *FVA1_{it} + \beta_2 *FVA2_{it} + \beta_3 *FVA3_{it} + \beta_4 *FVL12_{it} + \beta_5 *FVL3_{it} + \beta_6 *Net\ NonFV_{it} + \beta_7 *NI_{it} + \beta_8 *LNTA_{it} + \beta_9 *L_{it} + \beta_{10} *L_{it} *NI_{it} + \sum_{t=2014}^{2021} \delta_t year_t + \varepsilon_{it} \quad (1)$$

Where:

$$Net\ NonFV_{it} = BE_{it} - FVA1_{it} - FVA2_{it} - FVA3_{it} + FVL12_{it} + FVL3_{it}$$

And where *Price*it is the price of a share of firm i four months after the end of the fiscal year t. *FVA1*it (*FVA2*it; $FVA3_{it}$) is the FV of assets per share of firm i related to Level 1 (Level 2; Level 3) of the FV hierarchy at the end of the fiscal period t. $FVL12_{it}$ ($FVL3_{it}$) is the FV of liabilities per share of firm i related to Levels 1 and 2 (Level 3) of the FV hierarchy at the end of the fiscal period t. BE_{it} is a firm's book value of equity per share at the end of the fiscal period t. NI_{it} is a firm's net income per share at the end of the fiscal period t. $LNTA_{it}$ is the natural logarithm of a firm's total assets at the end of the fiscal period t. We controlled the size of the entity because previous studies argued that on the one hand, investors find FV estimates reported by small banks less reliable (Song et al., 2010) and on the other hand, 'valuation coefficients are higher for small financial firms than the coefficients for large financial firms' (Siekkinen, 2016, p. 11). We also examine whether the relationship between share price and book values is the same for profit and loss firms. For example, Hayn (1995, p. 125) reported that losses are 'less informative than profits about the firm's future prospects'. Therefore, we added a dummy variable L_{it} that takes the value one if a firm's earnings at the end of the fiscal period t are negative, and otherwise it is zero. As in other studies (e.g. Song et al., 2010; Goh et al., 2015; Mechelli & Cimini, 2019), we combined Level 1 and Level 2 liabilities. All variables are defined in Appendix D.

As other studies (e.g. Song et al., 2010; Goh et al., 2015) investigating the value relevance of Level 1, 2 and 3 FVs, we focus on the regression coefficients and corresponding standard error of Level 1 FV (or Level 2 FV or Level 3 FV) on share price. If the coefficients are significantly different from the value of zero, the FVs are considered value relevant. Assuming that the model is properly specified, and markets are efficient, the theoretically predicted value (coefficient) is expected to be 1 for assets (Level 1, Level 2 or Level 3 FV assets) and -1 for liabilities (Level 1, Level 2 or Level 3 FV liabilities) and therefore, these values are used as benchmarks for statistical testing (see also e.g. Song et al., 2010; Goh et al., 2015). Lower (higher) valuation coefficients of assets (Level 1, Level 2 or Level 3 FV) suggest that investors place less (more) weight on Level 1, 2 or 3 FV assets and lower (higher) valuation coefficients of liabilities (Level 1 and 2 or Level 3) suggest that investors place more (less) weight on Level 1, 2 or 3 FV liabilities.

4. Empirical results

Before dividing the sample countries into the IP clusters, we estimated the equation for the whole sample to examine the value relevance of FVs of the pooled sample. After examining the pooled sample, we divided the sample countries into the three clusters as described here and examined whether the value relevance of FVs varied across the three clusters. Table 7 reports the results of the four regressions. The standard errors in the regressions are clustered by firm (Rogers, 1993).

Table 7
Value relevance of FVs in different IP environments.

PRICE	ALL	STRONG PROTECTION	MEDIUM PROTECTION	WEAK PROTECTION
FVA1	1.406***	0.606***	0.042	0.115***
	(3.48)	(7.88)	(0.47)	(2.95)
FVA2	-0.707***	0.499***	-0.012	-0.059
	(-2.95)	(5.54)	(-0.30)	(-0.13)
FVA3	-2.737	1.001***	-0.195	-2.101
	(-1.36)	(3.76)	(-1.59)	(-1.14)
FVL12	0.512*	-0.500***	0.109	0.837
	(1.84)	(-5.17)	(1.63)	(1.51)
FVL3	3.258	-0.966***	0.018	9.907
	(1.09)	(-3.65)	(0.14)	(0.93)
Net non-FV	1.075**	0.642***	0.010	0.801***
	(2.25)	(6.97)	(0.59)	(4.08)
NI	2.469	0.589***	0.623	3.849***
	(1.12)	(9.74)	(0.94)	(2.96)
LNTA	-0.006	0.000	-0.004*	-0.001
	(-0.92)	(0.77)	(-1.76)	(-0.05)
L	0.010	-0.004*	-0.023**	0.000
	(0.65)	(-1.77)	(-2.03)	(0.01)
*L*NI*	-26.912*	-3.100	-19.024	14.956
	(-1.97)	(-0.61)	(-1.01)	(0.29)
cons	0.111	0.004	0.092*	0.346
	(0.83)	(0.60)	(1.85)	(1.23)
Observations	915	359	253	303
R-squared	0.752	0.758	0.419	0.921

This table presents the results of the regression analysis using three separate samples. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factor (VIF): 10.28 (strong protection); 3.50 (medium protection) and 7.92 (weak protection).

The results presented in Table 7 show that when the regression is estimated with the whole sample, FVA1, FVA2 and FVL12 are value relevant. The coefficients on FVA1 and FVA2 are 1.406 and -0.707 and are statistically significant at the 0.01 level. The coefficient on FVL12 is 0.512 and statistically significant at the 0.10 level. The adjusted R-squared (0.75) is equal to 0.74 as reported by Goh et al. (2015) but a little bit lower than those (between 0.84 and 0.88) reported by previous studies using European or international data (Siekkinen, 2016, 2017; Mechelli and Cimini, 2019). The coefficient on FVA1 is close to 1.183 as reported by Lawrence et al. (2016) and high compared to 0.162, 0.326 and 0.34, as reported by studies using an international/European data set (Siekkinen, 2016, 2017; Mechelli and Cimini, 2019). By contrast with the findings of previous studies, the coefficient on FVA2 is negative and the coefficient on FVL12 is positive. The coefficient on the net non-FV assets is 1.075 and statistically significant at the 0.05 level.

Table 7 presents the results of different IP environments: strong, medium and weak investor protection. As the table shows, all of the FVs in the FV hierarchy are value relevant in a strong IP environment. However, none of the FVs are value relevant in a medium IP environment and only FVA1 is value relevant in a weak IP environment. The adjusted R-squared for firms in the

strong IP cluster is lower (0.758) than 0.883 as reported by Siekkinen (2016) and higher than 0.690 and 0.677 as reported by Lawrence et al. (2016) and Song et al. (2010), but equal to 0.74 as reported by Goh et al. (2015).

The coefficients on FVA1, FVA2 and FVA3 are 0.606, 0.499 and 1.001, respectively, and statistically significant at the 0.01 level for firms in the strong IP cluster. This finding is interesting, since previous studies (e.g., Siekkinen, 2016; 2017; Goh et al., 2015; Lawrence et al., 2016) found that the coefficient on FVA3 is lower than FVA2 and/or FVA1. Siekkinen (2016) used international data and reports that 'for firms in the strong IP cluster, the FV coefficients for FVA1, FVA2 and FVA3 are 0.198, 0.247 and 0.211' and that FVA2 are significantly more value relevant than FVA1 and FVA3. The coefficients on FVA1 and FVA2 presented in Table 7 are lower than those (between 0.928 and 1.183) reported by Song et al. (2010), Goh et al. (2015) and Lawrence et al. (2016). However, the coefficient on FVA3 is higher than 0.87 and 0.683 as reported by Goh et al. and Song et al. (2010), but close to 1.092 as reported by Lawrence et al. (2016). In addition to this, the coefficient on FVA3 is not different from its theoretically predicted value of 1 and the coefficients on FVA1 and FVA2 are significantly less than 1. This result indicates that investors place less weight on Level 1 and Level 2 FV assets relative to Level 3 FV assets.

The table also shows that the coefficients on FVL12 and FVL3 are -0.500 and -0.966 and statistically significant at the 0.001 level. The coefficients are substantially less than -0.205 and -0.191 as reported by Siekkinen (2016). The coefficient on FVL3 is close to -0.87 as reported by Goh et al. and -1.175 as reported by Lawrence et al. (2016). The coefficient on FVL12 is significantly higher than -1 and the coefficient on FVL3 is not significantly different from its theoretically predicted value of -1. Our results show that the coefficient on FVL3 is significantly lower than FVL12 at the 0.05 level. Thus, our results indicate that investors place more weight on Level 3 FV liabilities than Level 1 and 2 FV liabilities.

Table 7 also shows that the coefficient on the net non-FV assets is 0.642 and higher than the net income (NI) coefficient of 0.589 for firms in the strong IP cluster. The table shows that the coefficients on the net non-FV assets and NI are 0.801 (t-statistic: 4.08) and 3.849 (t-statistic: 2.96) for firms in the weak IP cluster. The results reported by Siekkinen (2016) show that the coefficient on NI or earnings per share (EPS) is higher than the book value coefficients. Our results show that the NI coefficient is close to the book value coefficients in the strong IP cluster and substantially higher than the book value coefficient in the weak IP cluster. Therefore, our results indicate that the market value of equity is more extensively driven by earnings than by book values in a weak IP environment.

When we re-estimated the model without the natural logarithm of a firm's total assets (LNTA), loss variable (L) and interaction variable (L*NI) for firms in the strong IP cluster, the results were similar to those reported in Table 7. Table 8 presents the results of the re-estimated model. As the table shows, the coefficients on FVA1, FVA2 and FVA3 are 0.614, 0.505 and 0.994, respectively, and statistically significant at the 0.001 level. The coefficients on FVL12 and FVL3 are -0.503 and -0.958, respectively, and statistically significant at the 0.001 level. Table 8 also presents the test results for differences in the pricing of the assets and liabilities (F-tests). As the table shows, the coefficient on FVA1 is significantly different from that of FVA2 at the 0.10 level but not different from that of FVA3. However, the coefficient on FVA3 is significantly different from that of FVA2 at the 0.05 level and FVL12 is significantly different from that of FVL3 at the 0.05 level. The results of the re-estimated model (without LNTA, L and L*NI) for firms in the medium and weak IP clusters are similar to those reported in Table 7 and presented in Appendix E.

Table 8
Value relevance of FVs in a strong IP environment.

PRICE	COEFFICIENT	F-STAT (COEFF. = 1)	F-STAT (COEFF. = -1)
FVA1	0.614***		
	(8.01)	25.27***	
FVA2	0.505***		
	(5.60)	30.27***	
FVA3	0.994***		
	(3.79)	0.00	
FVL12	-0.503***		
	(-5.25)		26.88***
FVL3	-0.958***		
	(-3.68)		0.03
Net non-FV	0.647***		
	(7.05)		
NI	0.578***		
	(10.46)		
cons	0.008***		
	(3.60)		
Observations	359		
R-squared	0.756		
	F-TESTS (F-STAT)		
FVA1 = FVA2	1.95		
FVA1 = FVA 3	1.74		
FVA2 = FVA 3	3.53**		
FVL12 = FVL3	2.89**		

This table presents the results of the regression analysis using the strong IP cluster of countries. All variables are winsorised at the 1st and 99th percentiles. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. F-statistics test whether the coefficient estimates of each level of FV assets are different from 1 and whether the coefficient estimates of each level of FV liabilities are different from -1.

As Table 7 reports, the mean variance inflation factors (VIF) are between 3.5 and 10.28, meaning that multicollinearity may exist in the regression models. Following the lead of the paper by Filip et al. (2021a), we also tested the value relevance of the net FV assets (i.e. FV assets minus FV liabilities) by level to avoid possible multicollinearity problems. The Pearson correlations among the variables are presented in Appendix F and Table 9 presents the results of the four regressions.

Table 9
Value relevance of the net FV of assets in different IP environments

PRICE	ALL	STRONG PROTECTION	MEDIUM PROTECTION	WEAK PROTECTION
Net FV1	1.125***	0.660***	0.086	0.037
	(2.10)	(7.97)	(1.62)	(0.56)
Net FV2	-0.733***	0.644***	-0.017	-2.336***
	(-2.03)	(8.84)	(-0.38)	(-5.11)
Net FV3	-0.890	0.944**	-0.160	4.731***
	(-0.48)	(3.01)	(-1.28)	(3.75)
Net non-FV	1.161*	0.684***	0.003	0.815***
	(1.87)	(7.19)	(0.19)	(4.45)
NI	3.205	0.600***	0.798	4.561***
	(1.23)	(11.8)	(1.11)	(3.96)
LNTA	-0.001	0.002	-0.002	-0.039
	(-0.15)	(0.66)	(-0.81)	(-1.10)
L	-0.006	-0.004*	-0.025**	-0.057
	(-0.28)	(-1.93)	(-2.25)	(-0.85)
*L*NI*	-33.436***	-2.670	-22.653	13.118
	(-2.37)	(-0.53)	(-1.31)	(0.26)
cons	0.039	0.004	0.056	0.994
	(0.28)	(0.62)	(1.11)	(1.49)
Observations	915	359	253	303
R-squared	0.736	0.758	0.344	0.926

This table presents the results of the regression analysis using three separate samples. *Net FV1*$_{it}$ (*Net FV2*$_{it}$; *Net FV3*$_{it}$) is the net FV assets (i.e. FV assets minus FV liabilities) per share of firm i related to Level 1 (Level 2; Level 3) of the FV hierarchy at the end of the fiscal period t. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The standard errors in the regressions are clustered by firm. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factor (VIF): 2.81 (strong protection); 3.19 (medium protection) and 4.28 (weak protection).

As Table 9 reports, when the regression is estimated with the whole sample, Net FV1 and Net FV2 are value relevant. The coefficients on Net FV1 and Net FV2 are 1.125 and -0.733 and statistically significant at the 0.01 level. In contrast to the findings of previous studies (Filip et al., 2021a), the coefficient on FVA2 is negative. Filip et al. (2021a) report that the coefficients on Net FV1, Net FV2 and Net FV3 are 0.049, 0.083 and 0.158, respectively, for European banks between 2009 and 2016. As the table shows, all of the FVs in the FV hierarchy are value relevant in a strong IP environment. The coefficients on Net FV1 and Net FV2 are 0.660 and 0.644 and are statistically significant at the 0.01 level. The coefficient on Net FV3 is 0.944 and statistically significant at the 0.05 level. The table also reports that none of the net FV assets are value relevant in a medium IP environment. Finally, the table shows that the coefficients on Net FV2 and Net FV3 are -2.336 and 4.731, and these are statistically significant at the 0.01 level for firms in the weak IP cluster. This result suggests that investors recognise that the two net FV assets are value relevant. Finally, similarly to the results in Table 7, the results reported in Table 9 show that the NI coefficient is substantially higher than the book value coefficient in the weak IP cluster.

5. Robustness tests

Since around one-third of firms included in the strong IP cluster of countries are from the UK, the regression was estimated excluding observations from the UK to find out whether the UK

firms were driving the results (among the strong IP cluster of countries). The results presented in Table 10 show that although the UK firms are not included in the sample, all the FVs in the FV hierarchy are value relevant. The coefficients on FVA1, FVA2 and FVA3 are 0.673, 0.579 and 1.190, respectively, and statistically significant at the 0.01 level for firms in the strong IP cluster. Furthermore, the coefficients on FVL12 and FVL3 are -0.565 and -1.174 and statistically significant at the 0.01 level. Thus, after excluding the UK firms, the coefficients on the FV assets are higher and the FV liabilities lower, as reported in Table 10.

Table 10
Value relevance of FVs in a strong investor protection environment (without the UK)

PRICE	ALL (WITHOUT THE UK)	STRONG PROTECTION (WITHOUT THE UK)	STRONG PROTECTION
FVA1	0.536*** (2.78)	0.673*** (7.58)	0.606*** (7.88)
FVA2	-0.590*** (-3.93)	0.579*** (6.13)	0.499*** (5.54)
FVA3	-1.050 (-0.50)	1.190*** (3.43)	1.001*** (3.76)
FVL12	0.499 (2.46)	-0.565*** (-5.71)	-0.500*** (-5.17)
FVL3	2.402 (0.68)	-1.174*** (-3.38)	-0.966*** (-3.65)
Net non-FV	0.857 (8.90)	0.707*** (7.32)	0.642*** (6.97)
NI	2.997 (1.70)	0.515*** (6.30)	0.589*** (9.74)
LNTA	0.001 (0.17)	0.000 (0.42)	0.000 (0.77)
L	0.000 (0.02)	-0.001 (-0.23)	-0.004* (-1.77)
*L*NI*	-22.971 (-1.08)	0.180 (0.03)	-3.100 (-0.61)
cons	0.070 (0.53)	0.000 (0.02)	0.004 (0.60)
Observations	759	203	359
R-squared	0.908	0.769	0.758

This table presents the results of the regression analysis using three separate samples. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factor (VIF): 13.21 (strong protection).

Prior studies also suggest that differences in the value relevance of accounting figures between countries could be explained by the type of financial systems (bank-oriented vs. market-oriented). For example, Ali and Hwang (2000) found that the value relevance of financial accounting data is lower for countries with bank-oriented financial systems. Using 'hand-collected data on reported FVs of financial instruments for IFRS banks from 2006 through 2009', Fiechter et al. (2016, p. 392–394) found that the valuation discount on 'fair value through profit or loss' assets 'is more pronounced in bank-based economies'. To find out whether our results were driven by the financial structures of countries, we estimated the regression using an al-

ternative clustering of countries. More precisely, we categorised countries into 'market-based' and 'bank-based' clusters based on their financial structures in the early 2010s using the bank-market ratio. The 'ratio is defined as the ratio of total bank assets to stock and private bond market capitalisation' (see e.g. Langfield and Pagano, 2015, p. 39). The bank-based (market-based) cluster of countries includes those countries that have a ratio of above (less than) 4. The two clusters are presented in Table 11 and the regression results are presented in Table 12.

Table 11
Alternative clustering: Cluster membership of countries.

MARKET-BASED	BANK-BASED
Belgium	Austria
Czechia	Bulgaria
Denmark	Croatia
Estonia	Cyprus
Finland	Greece
France	Germany
The Netherlands	Hungary
Poland	Ireland
Portugal	Italy
Spain	Lithuania
Sweden	Malta
The UK	Romania
	Slovakia
	Slovenia

This table presents the cluster membership of the countries in the sample.

The results in Table 12 show that the financial structures of countries do not seem to drive the results of the regression presented in Table 7. The table shows that the coefficients on FVA1, NI and loss variable (L) are 0.160, 0.692 and -0.015, respectively, and statistically significant at the 0.001 level for firms in the market-based cluster. The coefficients on net non-FV assets (net non-FV) and NI are 0.649 and 4.359, respectively, and statistically significant at the 0.001 level for firms in the bank-based cluster of countries. Thus, as in the weak IP cluster of countries, in the bank-based cluster of countries, the coefficient on NI is substantially higher than the coefficient on net non-FV. This finding is in contrast to Anandarajan et al. (2011), who argue that earnings have less explanatory power in bank-based economies. Finally, the table shows that the coefficients on FVA3 and FVL3 are -3.140 and 3.659, respectively, and statistically significant at the 0.005 and 0.010 level for firms in the bank-based cluster of countries.

Since the COVID-19 pandemic caused a large shock to European economies in 2020, we also estimated the regression excluding observations from the years 2020 and 2021 to find out whether the results would remain the same. For example, previously, the study by Liu and Sun (2022) examined US firms and suggested that the Covid-19 pandemic impaired the value relevance of earnings. The regression results reported in Table 13 (and in Table 14) are roughly the same as in Table 7 (and in Table 9), except for the coefficients on FVA3 and FVL3 for the firms in the strong protection cluster. As Table 13 reports, the coefficients on FVA1, FVA2 and FVA3 are 0.684, 0.694 and 0.636, respectively, and statistically significant at the 0.01 level for firms in the strong investor protection cluster. Furthermore, the coefficient on FVL12 is -0.704 and

Table 12
Value relevance of FVs in bank-based and market-based environments.

PRICE	ALL	MARKET-BASED	BANK-BASED
FVA1	1.406***	0.160***	0.042
	(3.48)	(3.22)	(0.29)
FVA2	-0.707***	-0.008	0.002
	(-2.95)	(-0.33)	(0.00)
FVA3	-2.737	0.155	-3.140**
	(-1.36)	(0.67)	(-2.32)
FVL12	0.512*	-0.013	1.688
	(1.84)	(-0.34)	(1.68)
FVL3	3.258	-0.259	3.654*
	(1.09)	(-1.09)	(1.91)
Net non-FV	1.075**	0.003	0.649***
	(2.25)	(0.14)	(2.90)
NI	2.469	0.692***	4.359***
	(1.12)	(4.65)	(2.89)
LNTA	-0.006	0.000	-0.036*
	(-0.92)	(-0.08)	(-1.84)
L	0.010	-0.015***	-0.028
	(0.65)	(-2.66)	(-0.40)
*L*NI*	-26.912*	-42.010**	-10.130
	(-1.97)	(-2.34)	(-0.18)
cons	0.111	0.017	0.963*
	(0.83)	(1.64)	(1.88)
Observations	915	590	325
R-squared	0.752	0.417	0.910

This table presents the results of the regression analysis using three separate samples. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factor (VIF): 2.36 (market-based) and 12.55 (bank-based).

statistically significant at the 0.01 level. FVL3 is -0.627 and statistically significant at the 0.10 level. These results show that without 2020 and 2021 included, the coefficient on FVA3 (FVL3) would be lower (higher), indicating that investors would have placed more weight on Level 3 assets and liabilities, especially during the pandemic years. As the table reports, the three levels of financial assets and financial liabilities are not value relevant in the medium IP cluster of countries and only Level 1 financial assets are value relevant in the weak IP cluster of countries.

Table 13
Value relevance of FVs in different investor protection environments (2014–2019)

PRICE	ALL	STRONG PROTECTION	MEDIUM PROTECTION	WEAK PROTECTION
FVA1	0.383	0.684***	0.053	0.103***
	(0.81)	(10.49)	(0.51)	(6.47)
FVA2	-1.243***	0.694***	-0.005	-0.199
	(-2.74)	(7.39)	(-0.07)	(-0.29)
FVA3	-2.542	0.636***	-0.135	-1.074
	(-0.66)	(2.16)	(-0.92)	(-0.53)
FVL12	0.939	-0.704***	0.081	0.759
	(1.36)	(-7.43)	(1.04)	(1.32)
FVL3	2.845	-0.627*	-0.009	9.589
	(0.53)	(-1.81)	(-0.07)	(0.86)
Net non-FV	2.397	0.757***	0.002	0.795***
	(1.63)	(8.57)	(0.02)	(3.39)
NI	7.836	0.458***	0.673	4.704***
	(2.01)	(9.70)	(0.47)	(3.25)
LNTA	0.003	0.001	-0.004	-0.003
	(0.17)	(1.57)	(-1.52)	(-0.11)
L	-0.044	-0.004*	-0.018**	-0.034
	(-1.13)	(-1.74)	(-2.34)	(-0.58)
*L*NI*	-116.068**	-0.727	-1.814	2.560
	(-2.18)	(-0.18)	(-0.25)	(0.05)
cons	0.031	-0.000	0.076	0.338
	(0.11)	(-0.04)	(1.67)	(0.99)
Observations	676	262	189	224
R-squared	0.780	0.778	0.422	0.923

This table presents the results of the regression analysis using three separate samples. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factor (VIF): 10.79 (strong protection); 5.92 (medium protection) and 8.22 (weak protection).

Finally, we study in which time frames the results hold. Because the number of yearly observations is small and one needs 10–20 observations per parameter estimated, we decided to study specific (four-year) periods to find out whether the results hold in different time frames. First, we study periods before and after IFRS 9 is applied (mandatory effective date of 1. January 2018), between 2014 and 2017 and 2018 and 2021. Second, we also study whether the results for firms in the strong IP cluster hold for the Brexit period between 2016 and 2019. When we estimate the regression for the whole sample of firms, firms in the medium and weak clusters, we obtain similar results (not tabulated). None of the FVs in the FV hierarchy are value relevant for investors in a medium (weak) IP environment, except Level 1 and 2 FV liabilities (Level 1 and Level 3 assets and Level 1 and 2 FV liabilities) are value relevant between 2018 and 2021 (2014 and 2017). Table 15 reports that the results for firms in the strong IP cluster hold for the different timeframes. As Table 15 shows, all FV assets and liabilities are value relevant for investors in a strong IP environment in the different timeframes. However, the mean variance inflation factors (VIF) are between 10.79 and 19.30, meaning that there is a high risk that multicollinearity

Table 14
Value relevance of the net FV of assets in different investor protection environments (2014–2019)

PRICE	ALL	STRONG PROTECTION	MEDIUM PROTECTION	WEAK PROTECTION
Net FV1	0.222 (0.49)	0.674*** (10.27)	0.076 (1.02)	0.037 (0.07)
Net FV2	-1.155*** (-2.18)	0.663*** (10.93)	-0.015 (-0.21)	-3.171*** (-6.56)
Net FV3	-1.135 (-0.28)	0.772*** (2.99)	-0.133 (-0.83)	4.757*** (6.22)
Net non-FV	2.382 (1.54)	0.752*** (8.33)	-0.020 (-0.31)	0.927*** (8.21)
NI	8.059** (2.16)	0.467*** (9.55)	1.015 (0.73)	4.961*** (6.70)
LNTA	0.004 (0.39)	0.001 (1.62)	-0.002 (-0.72)	-0.058 (-1.09)
L	-0.057 (-1.23)	-0.004 (-1.59)	-0.019** (-2.43)	-0.118 (-1.26)
*L*NI*	-128.245*** (-2.39)	-0.486 (-0.12)	-7.353 (-1.26)	-0.802 (-0.02)
cons	0.014 (0.06)	0.000 (-0.08)	0.050 (1.04)	1.208 (1.26)
Observations	676	262	189	224
R-squared	0.776	0.771	0.375	0.940

This table presents the results of the regression analysis using three separate samples. *Net FV1*$_{it}$ (*Net FV2*$_{it}$; *Net FV3*$_{it}$) is the net FV assets (i.e. FV assets minus FV liabilities) per share of firm i related to Level 1 (Level 2; Level 3) of the FV hierarchy at the end of the fiscal period t. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The standard errors in the regressions are clustered by firm. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factor (VIF): 2.70 (strong protection); 5.42 (medium protection) and 3.62 (weak protection).

exists in the regression models. Therefore, we also tested the value relevance of the net FV assets (i.e., FV assets minus FV liabilities) by level to avoid possible multicollinearity problems. The results (not tabulated) show that the coefficients on Net FV1 and Net FV2 are 0.577 (0.770) and 0.541 (0.811) and statistically significant at the 0.01 level. The coefficient on Net FV3 is 0.950 (1.101) and statistically significant at the 0.05 level between 2018 and 2021 (2014 and 2017). The results indicate all net FV assets are value relevant for investors during this time period and that investors would have valued Level 3 estimates higher than Level 1 and Level 2 net FV assets.

Table 15
Value relevance of FVs in a strong IP environment in different timeframes.

PRICE	2014–2017	2014–2019	2016–2019	2018–2021
FVA1	0.787***	0.684***	0.695***	0.554***
	(11.86)	(10.49)	(9.13)	(8.20)
FVA2	0.836***	0.694***	0.732***	0.353***
	(9.67)	(7.39)	(7.16)	(3.76)
FVA3	0.954***	0.636***	0.630***	0.847***
	(4.27)	(2.16)	(2.59)	(2.27)
FVL12	-0.843***	-0.704***	-0.749***	-0.349***
	(-9.10)	(-7.43)	(-7.28)	(-3.65)
FVL3	-0.843***	-0.627*	-0.600***	-0.848***
	(-2.93)	(-1.81)	(-2.48)	(-2.21)
Net non-FV	0.839***	0.757***	0.767***	0.539***
	(20.62)	(8.57)	(7.15)	(5.06)
NI	0.412***	0.458***	0.577***	0.776***
	(10.63)	(9.70)	(11.83)	(8.48)
LNTA	0.001***	0.001	0.001	0.000
	(2.02)	(1.57)	(1.53)	(0.06)
L	-0.004	-0.004*	-0.004	-0.001
	(-1.37)	(-1.74)	(-1.45)	(-0.70)
*L*NI*	2.702	-0.727	-5.889	-0.690
	(0.68)	(-0.18)	(-1.23)	(-0.08)
cons	-0.005	-0.000	-0.002	0.003
	(-0.87)	(-0.04)	(-0.40)	(0.50)
Observations	165	262	188	194
R-squared	0.841	0.778	0.805	0.781

This table presents the results of the regression analysis using the strong IP cluster of countries. All variables except the dummy variables are winsorised at the 1st and 99th percentiles. The *t*-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The calculated mean variance inflation factors (VIF) are between 10.79 and 19.30.

6. Conclusions

This study analysed how investors priced the FV assets and liabilities reported by European banks under IFRS 13 between 2014 and 2021. IFRS 13 requires the use (and disclosure) of a FV hierarchy that categorises FVs into three categories (Level 1, Level 2 and Level 3) based on the data used to measure the FV. The study examined whether challenges related to IFRS 13 *Fair Value Measurement* implementation have been resolved in Europe and whether the value relevance of the FV estimates disclosed by the firms is associated with the IP environment between 2014 and 2021.

In contrast to Siekkinen (2017), we found that Level 3 FV assets and liabilities were not value relevant to investors when we estimated the regression for the whole sample of firms. However, we found that the Level 1 and 2 FV assets and Level 1 and 2 FV liabilities were value relevant. The results also show that all FV assets and liabilities are value relevant for investors in a strong IP environment. However, none of the FVs in the FV hierarchy are value relevant for investors in a medium IP environment and investors find only Level 1 assets useful in a weak IP environment. We also tested the value relevance of the net FV assets (i.e., FV assets minus FV liabilities) by

level to avoid possible multicollinearity problems and found that the three FV levels were value relevant for investors in a strong IP environment, none of the net FV assets were value relevant for investors in a medium IP environment and finally, Level 2 and Level 3 net FV assets were value relevant for investors in a weak IP environment. Taken together, our results imply that implementation challenges had been resolved only in an environment offering strong protection for investors. These findings provide valuable information for those developing enforcement mechanisms. The findings suggest that regulators should address investor protection environment aspects such as 'strength of auditing and reporting standards' or 'regulation of securities exchanges' to improve the usefulness of FV estimates. The weaknesses in the investor protection environment may explain, for example, why FVs are not value-relevant in a medium IP environment. Overall, to improve the usefulness of FV information, one should not only pay attention to enforcement by regulators but also other enforcement mechanisms that create incentives for different actors (managers, auditors, boards, regulators, courts, analysts, press, educators) to ensure successful implementation of financial reporting standards (see e.g. Ball, 2016).

While only Level 1 assets were value relevant for investors in a weak IP environment and none of the FV assets and liabilities were value relevant for investors in a medium IP environment, the study only analysed further the firms from countries with a strong IP environment to find out whether investors price so called mark-to-model and mark-to-market assets and liabilities differently to the FV estimates. The study provides valuable information for standard setters and contributes to the literature by showing that in a strong IP environment, investors do not place less weight on Level 3 estimates than Level 1 and Level 2 FV assets and liabilities but they value Level 3 assets higher than Level 2 assets and Level 3 liabilities higher than Level 1 and 2 liabilities. The results indicate that in a strong IP environment, investors are not concerned that Level 3 estimates are less reliable than Level 1 and Level 2 FV assets and liabilities. Studying US banks between 2008 and 2011, Altamuro and Zhang (2013, 833) also found that Level 3 FVs of MSRs 'better reflects the cash flow and risk characteristics of the underlying asset' than Level 2 FVs of MSRs do. Most previous studies (e.g., Song et al., 2010; Goh et al., 2015; Lawrence et al., 2016; Siekkinen, 2016, 2017; Mechelli and Cimini, 2019) found that Level 3 FVs have been priced lower than or equally to Level 1 and Level 2 FVs since the 2008 financial crisis. The results of the present study imply that investors placed more weight on Level 3 FVs between 2014 and 2021 in Europe (in the countries with a strong IP environment). As described here, the time period was special in Europe and therefore, investors might have paid special attention to these estimates that are based on managerial views and not otherwise available to capital markets (see also, e.g., Goh et al., 2015; Altamuro and Zhang; Fiechter et al., 2022). One can argue that the finding is also in line with the study by Filip et al. (2021b), which suggests that the work of preparers and auditors has improved over time and that auditors have better opportunities to evaluate the reliability of L3 FV estimates than a decade ago. If 'both expertise and the available information and analytical tools have greatly improved in recent years', it is easier for capital markets to trust in Level 3 FVs (Filip et al., 2021b, 277).

We acknowledge that the paper is limited by its sample size. The sample period is marked by several notable events (e.g., Brexit and COVID-19). Because the number of yearly observations is small (and the results from annual regressions would not be reliable), we could not examine how each of these events has impacted the value relevance of bank fair values. In addition, value relevance studies often suffer from correlated omitted variables (see e.g., Lawrence et al., 2016; Filip et al., 2021b). As Lawrence et al. (2016) define, a potential confounding

factor in studies examining the FV measurement hierarchy is that 'only a small fraction of the underlying firms' assets are measured at fair value'. Lawrence et al. define that, for example, Song et al. (2010) studied a sample of 431 banks and on average, 15 per cent of the total assets (and on average, 0.37 per cent of the total liabilities) were measured at fair value in their sample. As Lawrence et al. define, earlier literature (e.g., Ahmed and Takeda; 1995) suggests that 'concurrent changes in the value of assets recorded at amortized cost can cause a correlated omitted variables problem that biases the value relevance estimates' (p. 208). In our sample, on average, 34 percent of the total assets (and 14 percent of the total liabilities) are measured at fair value (see also 3.3 Descriptive statistics). More precisely, in strong, medium and weak clusters on average, 44, 25 and 28 percent of the total assets (and 15, 9 and 6 percent of the total liabilities) are measured at fair value. Therefore, the correlated omitted variable problem is not necessarily as serious as it was in the study by Song et al. (2010). In addition, by contrast to Song et al., we do not study the 2008 financial crisis period, during which off-balance sheet net assets might have caused a similar correlated omitted variables problem (Lawrence et al., 2016; Ahmed and Takeda, 1995). Future research could collect a global sample and analyse whether the IP environment is associated with the value relevance of the FV estimates disclosed by firms outside the EU. Siekkinen (2016) analysed a sample of firms from 34 countries between 2012 and 2014. However, IP environments have evolved over the past decade and firms that adopted IFRS 13 ten to fifteen years ago are also likely to be more experienced in reporting under the standard today than ten to fifteen years ago. One could evaluate whether the same learning effect, that is probably explaining the value-relevance of the FVs in the strong IP environment in Europe, has happened in other parts of the world. One could expect that the same learning effect would have occurred in other parts of the world where an environment provides strong protection for investors.

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Appendix A
Descriptive statistics of the strong IP cluster of countries.

	N	MEAN	STD	MIN.	Q1	MEDIAN	Q3	MAX.
Price	359	0.019	0.021	0.000	0.006	0.012	0.024	0.095
FVA1	359	0.029	0.039	0.000	0.002	0.013	0.042	0.188
FVA2	359	0.030	0.082	0.000	0.000	0.004	0.020	0.541
FVA3	359	0.010	0.041	0.000	0.000	0.001	0.003	0.316
FVL12	359	0.034	0.080	0.000	0.000	0.008	0.028	0.501
FVL3	359	0.007	0.041	0.000	0.000	0.000	0.000	0.325
Net non-FV	359	-0.008	0.034	-0.142	-0.018	-0.001	0.003	0.099
NI	359	0.004	0.013	-0.001	0.000	0.001	0.003	0.093
LNTA	359	16.141	2.848	10.385	14.251	15.708	18.454	21.526
L	359	0.072	0.260	0	0	0	0	1

This table presents descriptive statistics of the variables that are used in this study. The table shows means, medians, standard deviations (Std), minimums, maximums, and quartiles of the test variables on a share basis. All variables are defined in the text.

Appendix B
Descriptive statistics of the medium IP cluster of countries.

	N	MEAN	STD	MIN.	Q1	MEDIAN	Q3	MAX.
Price	253	0.031	0.042	0.000	0.002	0.009	0.050	0.185
FVA1	253	0.057	0.093	0.000	0.003	0.012	0.067	0.399
FVA2	253	0.188	0.341	0.000	0.000	0.010	0.184	1.451
FVA3	253	0.013	0.039	0.000	0.000	0.000	0.006	0.227
FVL12	253	0.084	0.144	0.000	0.000	0.010	0.087	0.593
FVL3	253	0.009	0.034	0.000	0.000	0.000	0.000	0.254
Net non-FV	253	0.089	0.274	-0.177	-0.004	0.001	0.026	1.199
NI	253	0.012	0.025	-0.003	0.000	0.001	0.006	0.107
LNTA	253	17.759	2.140	13.965	16.237	17.312	19.640	21.091
L	253	0.107	0.309	0	0	0	0	1

This table presents descriptive statistics of the variables that are used in this study. The table shows means, medians, standard deviations (Std), minimums, maximums, and quartiles of the test variables on a share basis. All variables are defined in the text.

Appendix C
Descriptive statistics of the weak IP cluster of countries.

	N	MEAN	STD	MIN.	Q1	MEDIAN	Q3	MAX.
Price	303	0.690	3.765	0.000	0.002	0.007	0.026	25.200
FVA1	303	1.037	6.364	0.000	0.002	0.010	0.038	48.555
FVA2	303	0.242	1.222	0.000	0.000	0.002	0.013	9.194
FVA3	303	0.045	0.253	0.000	0.000	0.000	0.002	1.895
FVL12	303	0.271	1.652	0.000	0.000	0.001	0.008	13.544
FVL3	303	0.003	0.018	0.000	0.000	0.000	0.000	0.143
Net non-FV	303	0.112	2.837	-12.867	-0.014	-0.002	0.001	14.393
NI	303	0.086	0.472	-0.013	0.000	0.000	0.003	3.490
LNTA	303	16.554	1.732	12.854	15.369	16.744	17.923	20.572
L	303	0.208	0.406	0	0	0	0	1

This table presents descriptive statistics of the variables that are used in this study. The table shows means, medians, standard deviations (Std), minimums, maximums, and quartiles of the test variables on a share basis. All variables are defined in the text.

Appendix D
Variable definitions

VARIABLE	DEFINITION	DATA SOURCE
Price	the price of a share of firm i four months after the fiscal year-end	Orbis
FVA1	Level 1 FV assets scaled by common shares outstanding at the fiscal year-end	Annual report
FVA2	Level 2 FV assets scaled by common shares outstanding at the fiscal year-end	Annual report
FVA3	Level 3 FV assets scaled by common shares outstanding at the fiscal year-end	Annual report
FVL12	Level 1 + Level 2 FV liabilities scaled by common shares outstanding at the fiscal year-end	Annual report
FVL3	Level 3 FV liabilities scaled by common shares outstanding at the fiscal year-end	Annual report
Net FV1	Level 1 FV assets minus Level 1 FV liabilities scaled by common shares outstanding at the fiscal year-end	Annual report
Net FV2	Level 2 FV assets minus Level 2 FV liabilities scaled by common shares outstanding at the fiscal year-end	Annual report
Net FV3	Level 3 FV assets minus Level 3 FV liabilities scaled by common shares outstanding at the fiscal year-end	Annual report
Net non-FV	BE - FVA1 - FVA2 - FVA3 + FVL12 + FVL3	Annual report
BE	Book value of equity scaled by common shares outstanding at the fiscal year-end	Orbis
NI	Net income scaled by common shares outstanding at the fiscal year-end	Orbis
LNTA	Natural logarithm of a firm's total assets at the fiscal year-end	Orbis
L	Dummy variable equal to 1 if earnings are negative and 0 otherwise	Orbis

Appendix E
Value relevance of FVs in the medium and weak IP clusters.

PRICE	MEDIUM PROTECTION	WEAK PROTECTION
FVA1	0.018 (0.19)	0.114*** (2.81)
FVA2	-0.009 (-0.23)	-0.060 (-0.14)
FVA3	-0.174 (-1.49)	-2.135 (-1.27)
FVL12	0.087 (1.25)	0.838 (1.51)
FVL3	0.021 (0.18)	9.940 (0.96)
Net non-FV	0.015 (0.94)	0.797*** (4.38)
NI	0.715 (1.05)	3.871*** (3.16)
cons	0.013 (1.77)	0.314 (1.20)
Observations	253	303
R-squared	0.367	0.921

This table presents the results of the regression analysis using the medium and weak IP clusters of countries. All variables are winsorised at the 1st and 99th percentiles. The t-statistics (in parentheses) test whether the coefficient estimates are different from 0. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Appendix F
Correlation matrix

	PRICE	*NET FV1*	*NET FV2*	*NET FV3*	*NET NON-FV*	*NI*	*LNTA*	*L*
Price	1.00							
Net FV1	0.81***	1.00						
Net FV2	0.35***	0.41***	1.00					
Net FV3	0.60***	0.76***	0.30***	1.00				
Net non-FV	0.53***	0.37***	0.62***	0.22***	1.00			
NI	0.80***	0.88***	0.41***	0.69***	0.42***	1.00		
LNTA	0.01	0.07	-0.00	0.03	-0.04	-0.01	1.00	
L	-0.01	-0.03	-0.06	-0.01	-0.02	-0.08	0.01	1.00

This table presents the Pearson correlations among the variables used in the regression analyses. *, **, *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively. Variables are defined in the text.